

STATE OF MISSOURI  
**DEPARTMENT OF NATURAL RESOURCES**  
MISSOURI CLEAN WATER COMMISSION



**MISSOURI STATE OPERATING PERMIT**

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92<sup>nd</sup> Congress) as amended,

Permit No.: MO-0101729

Owner: Kyowa Hakko Kogyo, Ltd.  
Address: PO Box 1550, Cape Girardeau, MO 63702

Continuing Authority: Same as above  
Address: Same as above

Facility Name: BIOKYOWA, Inc./Kyowa Foods, Inc.  
Address: 5469 Nash Road, Cape Girardeau, MO 63702

Legal Description: See page 2

Receiving Stream & Basin: See page 2

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

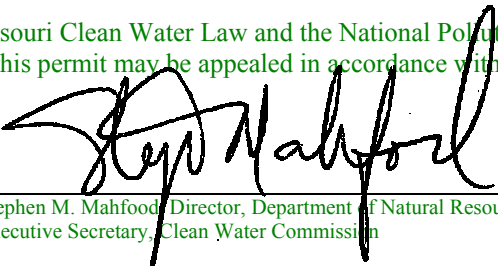
**FACILITY DESCRIPTION**

See page 2

This permit authorizes only wastewater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6 of the Law.

January 14, 2000      September 3, 2004  
Effective Date      Revised

January 13, 2005  
Expiration Date  
MO 780-0041 (10-93)

  
Stephen M. Mahfood, Director, Department of Natural Resources  
Executive Secretary, Clean Water Commission

Jim Hull, Director of Staff, Clean Water Commission

OUTFALL NUMBER	PURPOSE OF DISCHARGE	LEGAL DESCRIPTION	BASIN, RIVER REACH, AND DESIGNATED USAGE	SAMPLING LOCATIONS
001	DISCHARGE OF TREATED PROCESS WASTEWATER	NW ¼, SE ¼, SEC. 20, T30N, R14E, CAPE GIRARDEAU COUNTY	MISSISSIPPI RIVER, BASIN 53, 07140107-00-00  IRR, LWW, AQL, BTG, DWS, IND	AT THE WASTEWATER TREATMENT PLANT PRIOR TO ENTRY INTO THE PIPE LINE LEADING TO THE MISSISSIPPI
002	DISCHARGE OF NON- CONTACT COOLING WATER AND STORMWATER	NE ¼, NE ¼, SEC. 28, T30N, R13E, CAPE GIRARDEAU COUNTY	HEADWATERS DIVERSION CHANNEL, BASIN 53, 07140107-01-00  LWW, AQL, BTG, WBC	AT THE DISCHARGE POINT INTO THE DIVERSION CHANNEL

FACILITY DESCRIPTION (continued)

Outfall #001 - Industry - Process Water: Treatment facilities consist of a flow equalization basin where pH adjustment takes place, dual stacked media roughing filters, primary clarification, two complete activated sludge processes operated in parallel (aeration basins and final clarifiers), and filtration. Sludge is thickened with dissolved air flotation process. See Outfall #003 for sludge disposal. Average flow is 1.0 MGD before completion of expansion, and 2.0 MGD after completion. Discharge is to the Mississippi River.

Sampling Location - At the wastewater treatment plant prior to entry into the pipe line leading to the Mississippi.

Outfall #002 - Industry - No treatment is provided. Non contact cooling water. Average flow is 10.0 MGD, and discharge is to the Headwater Diversion Channel. After March 31, 2002 this flow will also contain the stormwater flow from the industrial yard of the production plant.

Sampling Location - At the discharge point into the diversion channel.

Outfalls #001 & #002 - Instream Monitoring  
Exact locations to be approved by the Department.

Outfall # 003 - Land Application System Design:

Facility type: No-discharge Storage and Land Application System for year-round biosolids production. Biosolids (sludge) removed during wastewater treatment under Outfall #001 are stored and then land applied. Biosolids are land applied at nutrient fertilization rates onto agricultural sites. Application rate is based on land application of biosolids using a Nutrient loading rate (nitrogen and phosphorus) and pollutant loading rate. The receiving stream watersheds for the application sites are gaining streams.

Four (4) biosolids storage tanks located at the wastewater treatment plant have storage capacity of 1,462,092 gallons for 75 days storage of biosolids production.

Design biosolids production after dewatering is 16,070 gallons/day and 5,785,550 gallons per year at 10% solids (2,467 dry tons/year).

Design Application rates/acre/year are approximately 1-2 dry tons/acre or 2,344 - 4,688 gallons/acre. Actual rates are based on nutrient management plan using current testing and crops grown for each field.

Land Application site(s) are at total of 9,900.5 acres located in Cape Girardeau, Scott, New Madrid and Mississippi Counties as listed in the permit application. The permittee owns 1,108.4 acres and another 8,792.1 acres are under spreading agreement with Stallings Brothers Farms Shelton Farms, Hall Farms and Vince Draper Farms.

Application site(s) have field slopes less than 8.0 percent.

Vegetation grown on the application sites are hay crops and row crops.

Application equipment type is one 3,500 gallon tank truck with subsurface injectors and three trailer nurse tanks of 5,700 gallons each.

Outfall #004 - Groundwater Monitoring Wells at land application sites. Monitoring wells are designated as the following well numbers:

Headlight Farm Irrigation Wells: BIO-1A, BIO-2A, BIO-3A, BIO-4A;  
Green Farm Irrigation Well: BIO-10A  
Headquarters Farm Wells: Irrigation Well = IW/ST-1A, Home Well = HW/ST-1A; and  
Fox Meadow Farm Irrigation Wells: North = N/ST-2A, South = S/ST-2A.

<b>A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS</b>					PAGE NUMBER 4 of 16	
					PERMIT NUMBER MO-0101729	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The interim effluent limitations shall become effective upon issuance and remain in effect until March 30, 2002. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	INTERIM EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
<u>Outfall #001 - Process wastewater</u>						
Flow	MGD	*		*	daily	24 hr. total
Biochemical Oxygen Demand <sub>5</sub>	mg/L	*		*	once/week	24 hr. comp.
	lbs/day	7,400		5,500	once/week	24 hr. comp.
Chemical Oxygen Demand	mg/L	*		*	once/week	24 hr. comp.
	lbs/day	35,000		31,000	once/week	24 hr. comp.
Total Suspended Solids	mg/L	*		*	once/week	24 hr. comp.
	lbs/day	15,900		7,900	once/week	24 hr. comp.
pH - Units	SU	**		**	once/week	grab
Nitrate as N	mg/L	*		*	once/week	grab
	lb/day	*		*	once/week	calculated
Ammonia as N	mg/L	*		*	once/week	grab
	lbs/day	21,420		16,715	once/week	calculated
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>October 28, 2000</u> .						
Whole Effluent Toxicity (WET) Test	% Survival	Special Condition #8			twice/year	24 hr. comp.
MONITORING REPORTS SHALL BE SUBMITTED <u>SEMI-ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>July 28, 2000</u> .						
<u>Influent to Treatment Plant</u>						
Biochemical Oxygen Demands	mg/L	*		*	once/month	24 hr. comp.
Chemical Oxygen Demand	mg/L	*		*	once/month	24 hr. comp.
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>March 28, 2000</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
<b>B. STANDARD CONDITIONS</b>						
IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED <u>Part I</u> STANDARD CONDITIONS DATED <u>October 1, 1980</u> , AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.						

<b>A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS</b>					PAGE NUMBER 5 of 16	
					PERMIT NUMBER MO-0101729	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective March 31, 2002 and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
<u>Outfall #001 - Process wastewater</u>						
Flow	MGD	*		*	daily	24 hr. total
Biochemical Oxygen Demand <sub>5</sub>	lbs/day mg/L	7,939		5,425	once/week	24 hr. comp.
		*		*	once/week	24 hr. comp.
Chemical Oxygen Demand	lbs/day mg/L	50,415		34,448	once/week	24 hr. comp.
		*		*	once/week	24 hr. comp.
Total Suspended Solids	lbs/day mg/L	20,645		11,576	once/week	24 hr. comp.
		*		*	once/week	24 hr. comp.
pH - Units	SU	**		**	once/week	grab
Ammonia as N	lbs/day mg/L	14,561		10,745	once/week	grab
		*		*	once/week	grab
Nitrate as N	lbs/day mg/L	*		*	twice/week	calculated
		*		*	twice/week	grab
<u>Influent to Treatment Plant</u>						
Biochemical Oxygen Demand <sub>5</sub>	mg/L	*		*	once/week	24 hr. comp.
	lbs/day	*		*	once week	24 hr. comp.
Chemical Oxygen Demand	mg/L	*		*	once/week	24 hr. comp.
	lbs/day	*		*	once week	24 hr. comp.
MONITORING REPORT SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>October 28, 2000</u> .						
Whole Effluent Toxicity (WET) Test	% Survival	Special Conditions #8			twice/year	24 hr. comp.
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>October 28, 2000</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
<b>B. STANDARD CONDITIONS</b>						
IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED <u>Part I</u> STANDARD CONDITIONS DATED <u>October 1, 1980</u> , AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.						

<b>A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS</b>					PAGE NUMBER 6 of 16	
					PERMIT NUMBER MO-0101729	
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective upon issuance and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
OUTFALL NUMBER AND EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
<u>Outfall #002 - Cooling water and stormwater</u>						
Flow	MGD	*		*	daily	24 hr. total
Upstream Temperature	°F	*		*	once/month	grab
Downstream Temperature	°F	*		*	once/month	grab
Net Temperature Difference	°F	*		*	once/month	grab
pH - Units	SU	**		**	once/month	grab
Oil and Grease	mg/L	15		10	once/month	grab
Nitrate as N	mg/L	*		*	once/month	grab
	lb/day	*		*	once/month	calculated
Ammonia as N	mg/L	*		*	once/month	grab
	lb/day	*		*	once/month	calculated
MONITORING REPORTS SHALL BE SUBMITTED <u>MONTHLY</u> ; THE FIRST REPORT IS DUE <u>March 28, 2000</u> .						
<u>Outfalls #001 &amp; #002 - Instream Monitoring***</u>						
Ammonia as N	mg/L	10		10	once/year	grab
Nitrate as N	*	*		*	once/year	grab
pH - Units	SU	*		*	once/year	grab
<u>Outfall #004 - Groundwater Monitoring Wells at land application sites (Note: See Special Conditions for additional land application requirements)</u>						
Groundwater depth	feet	*			once/quarter****	*****
Nitrate/Nitrite as N	mg/L	10			once/quarter****	grab
pH - Units	SU	*			once/quarter****	grab
Total Dissolved Solids	mg/L	*			once/quarter****	grab
MONITORING REPORTS SHALL BE SUBMITTED <u>ANNUALLY</u> ; THE FIRST REPORT IS DUE <u>October 28, 2000</u> . THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
<b>B. STANDARD CONDITIONS</b>						
IN ADDITION TO SPECIFIED CONDITIONS STATED HEREIN, THIS PERMIT IS SUBJECT TO THE ATTACHED <u>Part I</u> STANDARD CONDITIONS DATED <u>October 1, 1980</u> , AND HEREBY INCORPORATED AS THOUGH FULLY SET FORTH HEREIN.						

MO 780-0010 (8/91)

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (continued)

- \* Monitoring requirement only.
- \*\* pH is measured in pH units and is not to be averaged. The pH is limited to the range of 6.0-9.0 pH units.
- \*\*\* Collection techniques and locations to be approved by the Department.
- \*\*\*\* Sample each well once per quarter in the months of March, May, July & September.
- \*\*\*\*\* Depth of water table below ground surface.

C. SCHEDULE OF COMPLIANCE

1. By January 31, 2000, submit an Engineering Report for the construction of the proposed wastewater treatment improvements at Biokyowa.
2. By February 1, 2000, submit a revised Biosolids Management Plan.
3. By October 30, 2000, have completed and submitted the engineering plans and specifications to both the Missouri Department of Natural Resources (MDNR) and the United States Corps of Engineers (COE) (for their review, approval and permitting) the design for the proposed Mississippi River diffuser system.
4. By May 30, 2001, begin construction.
5. By December 31, 2001, complete construction. Begin verify diffuser plume by tracer studies, begin adjustment of equipment to final performance expectation, and to perfect the monitoring equipment and procedures.
6. By February 28, 2002, complete start-up/performance testing of the new facilities.
7. By March 30, 2002, achieve compliance with the terms of the final limits contained in NPDES permit MO-0101729.

D. SPECIAL CONDITIONS

1. All outfalls must be clearly marked in the field.
2. For all outfalls, report as no-discharge when a discharge does not occur from an outfall during the monitoring period.
3. Discharge shall be limited so as not to violate Missouri Department of Natural Resources Water Quality Standards 10 CSR 20-7.031(4) (D) and 10 CSR 20-7.031(4) (A) (6) regarding temperature elevation of the receiving stream. In lieu of monitoring, discharger may certify that no discharges of heated water have occurred which could cause violation of these standards.
4. This permit may be reopened at any time: a) to address hypoxia issues in the Gulf of Mexico; or b) to address continuous electronic monitoring of ammonia and other pollutants if permit limits are violated or if the diffuser constantly fails.
5. This permit may be reopened and modified, or alternatively revoked and reissued, to:
  - (a) Comply with any applicable effluent standard or limitation issued or approved under Sections 301(b) (2) (C) and (D), 304(b) (2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
    - (1) contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
    - (2) controls any pollutant not limited in the permit.
  - (b) Incorporate new or modified effluent limitations or other conditions, if the result of a waste load allocation study, toxicity test or other information indicates changes are necessary to assure compliance with Missouri's Water Quality Standards.
  - (c) Incorporate new or modified effluent limitations or other conditions if, as the result of a watershed analysis, a Total Maximum Daily Load (TMDL) limitation is developed for the receiving waters which are currently included in Missouri's list of waters of the state not fully achieving the state's water quality standards, also called the 303(d) list.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

D. SPECIAL CONDITIONS (continued)

7. General Criteria. The following water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:
- (a) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses;
  - (b) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
  - (c) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses;
  - (d) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life;
  - (e) There shall be no significant human health hazard from incidental contact with the water;
  - (f) There shall be no acute toxicity to livestock or wildlife watering;
  - (g) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community;
  - (h) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.
8. Whole Effluent Toxicity (WET) tests will be conducted as follows:

SUMMARY OF WET TESTING FOR THIS PERMIT				
OUTFALL	A.E.C. %	FREQUENCY	SAMPLE TYPE	MONTH
Interim - Outfall #001	(Monitor only) 10%	twice yearly	24 hr. comp.	January & July
Final - Outfall #001 no diffuser	10%	twice yearly	24 hr. comp.	January & July
Final - Outfall #001 with diffuser	0.23%†	twice yearly	24 hr. comp.	January & July

† Adequate diffuser operation shall be confirmed with in-stream sampling conducted once per calendar year following initiation of diffuser operation. The initial sampling event shall be performed as soon as safe conditions occur, and the river flow is less than the 150,000 cfs. If possible, sampling in the second year shall be performed when river flow is less than 100,000 cfs. Flow data from the USGS station at Thebes shall be used. A suitable tracer approved by MDNR must demonstrate that sufficient dilution is taking place:

- (1) within the ZID to reduce ammonia-N concentrations to the "acute" aquatic-life criterion of 10 mg/L at the edge of the ZID. The ZID is considered to extend 150 feet downstream beyond the end of the diffuser; these distances may be modified, pending diffuser studies.
- (2) within a mixing zone to reduce concentrations to the chronic criterion at the edge of the mixing zone downstream of the diffuser. Mixing zone and ZID to be determined by the Department.

A sampling plan must be approved by MDNR prior to operation of the diffuser. Confirmatory ammonia sampling shall be required at the edge of the ZID and the mixing zone. A report presenting the results of each monitoring event shall be prepared within 90 days after completion of sampling and submitted to the Department. In addition, an annual report summarizing diffuser maintenance activities and any known damage, port repositioning, or port plugging shall be submitted by February 15 of the following year.



D. SPECIAL CONDITIONS (continued)

8. Whole Effluent Toxicity (WET) (continued)

(a) Test Schedule and Follow-Up Requirements

- (1) Perform a single-dilution test in the months and at the frequency specified above. If the effluent passes the test, do not repeat the test until the next test period.  
Submit test results along with complete copies of the test reports as received from the laboratory within 30 calendar days of availability to the WPP, Water Quality Monitoring and Assessment Section, P.O. Box 176, Jefferson City, MO 65102.
- (2) If the effluent fails the test, a multiple dilution test shall be performed within 30 calendar days, and biweekly thereafter, until one of the following conditions are met:
  - (a) THREE CONSECUTIVE MULTIPLE-DILUTION TESTS PASS. No further tests need to be performed until next regularly scheduled test period.
  - (b) A TOTAL OF THREE MULTIPLE-DILUTION TESTS FAIL.
- (3) The permittee shall submit a summary of all test results for the test series along with complete copies of the test reports as received from the laboratory to the WPP, Water Quality Monitoring and Assessment Section, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the third failed test.
- (4) Additionally, the following shall apply upon failure of the third test: A toxicity identification evaluation (TIE) or toxicity reduction evaluation (TRE) is automatically triggered. The permittee shall contact WPP, Water Quality Monitoring and Assessment Section to ascertain as to whether a TIE or TRE is appropriate. The permittee shall submit a plan for conducting a TIE or TRE to the Planning Section of the WPP within 60 calendar days of the date of DNR's direction to perform either a TIE or TRE. This plan must be approved by DNR before the TIE or TRE is begun. A schedule for completing the TIE or TRE shall be established in the plan approval.
- (5) Upon DNR's approval, the TIE/TRE schedule may be modified if toxicity is intermittent during the TIE/TRE investigations. A revised WET test schedule may be established by DNR for this period.
- (6) If a previously completed TIE has clearly identified the cause of toxicity, additional TIEs will not be required as long as effluent characteristics remain essentially unchanged and the permittee is proceeding according to a DNR approved schedule to complete a TRE and reduce toxicity. Regularly scheduled WET testing as required in the permit, without the follow-up requirements, will be required during this period.
- (7) All failing test results shall be reported to WPP, Water Quality Monitoring and Assessment Section, P.O. Box 176, Jefferson City, MO 65102 within 14 calendar days of the availability of the results.
- (8) When WET test sampling is required to run over one DMR period, each DMR report shall contain information generated during the reporting period.
- (9) Submit a concise summary of all test results with the annual report.

D. SPECIAL CONDITIONS (continued)

8. Whole Effluent Toxicity (WET) (continued)

(b) PASS/FAIL procedure and effluent limitations:

- (1) To pass a single-dilution test, mortality observed in the AEC test concentration shall not be significantly different (at the 95% confidence level;  $p = 0.05$ ) than that observed in the upstream receiving-water control sample. The appropriate statistical tests of significance will be those outlined in the most current USEPA acute toxicity manual or those specified by the MDNR.
- (2) To pass a multiple-dilution test:
  - (a) the computed percent effluent at the edge of the zone of initial dilution, Acceptable Effluent Concentration (AEC), must be less than three-tenths (0.3) of the  $LC_{50}$  concentration for the most sensitive of the test organisms; or,
  - (b) all dilutions equal to or greater than the AEC must be nontoxic. Failure of one multiple-dilution test is an effluent limit violation.

(c) Test Conditions

- (1) Test Type: Acute Static non-renewal
- (2) Test species: Ceriodaphnia dubia and Pimephales promelas (fathead minnow). Organisms used in WET testing shall come from cultures reared for the purpose of conducting toxicity tests and cultured in a manner consistent with the most current USEPA guidelines. All test animals shall be cultured as described in the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms.
- (3) Test period: 48 hours at the "Acceptable Effluent Concentration" (AEC) specified above.
- (4) When dilutions are required, upstream receiving stream water shall be used as dilution water. If upstream water is unavailable or if mortality in the upstream water exceeds 10%, "reconstituted" water will be used as dilution water. Procedures for generating reconstituted water will be supplied by the MDNR upon request.
- (5) Single-dilution tests will be run with:
  - (a) Effluent at the AEC concentration;
  - (b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
  - (c) reconstituted water.
- (6) Multiple-dilution tests will be run with:
  - (a) 100%, 50%, 25%, 12.5%, and 6.25% effluent, unless the AEC is less than 25% effluent, in which case dilutions will be 4 times the AEC, two times the AEC, AEC, 1/2 AEC and 1/4 AEC;
  - (b) 100% receiving-stream water (if available), collected upstream of the outfall at a point beyond any influence of the effluent; and
  - (c) reconstituted water.
- (7) If reconstituted-water control mortality for a test species exceeds 10%, the entire test will be rerun.

D. SPECIAL CONDITIONS (continued)

9. A sampling plan must be approved by MDNR prior to operation of the diffuser. Confirmatory ammonia sampling shall be required at the edge of the Zone of Initial Dilution and the mixing zone. A report presenting the results of each monitoring event shall be prepared within 90 days after completion of sampling and submitted to the Department. In addition, an annual report summarizing diffuser maintenance activities and any known damage, port repositioning, or port plugging shall be submitted by February 15 of the following year.
10. The permittee shall have a continuous pressure recording device installed on the discharge pipeline to the river diffuser. This device shall be located at the wastewater treatment plant control room so the operator can determine the normal operating pressure range of the diffuser system. Abnormalities such as a broken line, or disrupted diffuser would be noted quickly for repair and reporting purposes, and will also sound an alarm.
11. The permittee shall contact MDNR if the construction is completed ahead of schedule and they wish to begin operations of the new facilities earlier than planned. Upon this request MDNR will enact the final limits of this permit at the earlier date requested.
12. Industrial BIOSOLIDS - General
  - (a) Biosolids Responsibility. The responsibility for biosolids management lies with the Permittee, and none of that responsibility can be delegated to other parties. The term biosolids in this permit is meant to include both the thickened sludge from the diffused air flotation units and the amount of CMS from the evaporators that is applied to land units identified in the current Biosolids Management Plan and permit application Form R. Records of the amount of CMS that is produced and sold as a by-product for other uses must be submitted upon request of MDNR.
  - (b) Adding Application Sites. A permit modification is required to add new sites acquired, by purchase, lease, agreement or contract, for land application of biosolids. Permittee should submit a revised application Form A, mailing addresses for first down stream land owners of each site, geologic report, topographic maps and other pertinent information for the proposed sites.
  - (c) Construction of Biosolids Storage. If additional biosolids storage facilities become necessary, a construction permit shall be obtained before construction of such facilities begins, and the facilities shall be built in accordance with the appropriate design guides.
  - (d) Testing requirements. Testing will be performed on the biosolids as follows: daily for pH and total solids content; monthly for nutrients including organic nitrogen as N, ammonia nitrogen as N, nitrate nitrogen as N, total phosphorus as P and total potassium as K; monthly for heavy metals content; and yearly for toxicants.
  - (e) Geologic Evaluations. A geological evaluation will be made on each application site by a Geologist registered in the State of Missouri. All limiting geological features shall be identified.
  - (f) Topographic Site Maps. Site maps of land application areas shall be submitted to the Regional Office and WPCP Central Office. The maps shall show topographic contours, drainage courses, sink holes, ponds, wells, buffer areas, property boundary, legal description and other pertinent features. The maps should use a base map such as the USGS 7.5 minute quad sheets or equivalent at a scale of at least one inch equals 1000 feet or 2000 feet (1"= 1000' to 2000'). In addition, an overall location map should be included showing the locations of all sites using a smaller scale such as 1" = 2 miles as is used on the county maps in the Missouri Conservation Atlas by the Missouri Department of Conservation.

D. SPECIAL CONDITIONS (continued)

12. Industrial BIOSOLIDS - General (continued)

- (g) Land Application Rate. Permittee shall operate the land application system in accordance with the design parameters listed in the Facility Description and Special Conditions sections of this permit. Application rates shall be based on the Plant Available Nitrogen procedures and Biosolids Management Plan.
- (h) Fact Sheets. Fact sheets shall be prepared for each application site giving the following information. Land owners name, address, telephone number, acreage, designation of buffer zones around limiting features, nutrient content of biosolids and the application rates with the maximum per year. The actual boundaries of the allowed land application locations will be marked on each site prior to the injecting of biosolids.
- (i) Biosolids Transport. Biosolids will be hauled to the application site by highway tanker trailer. Any spillage from the transporting operation must be cleaned up immediately, and the quantity spilled must be reported within twenty-four (24) hours.
- (j) Subsurface Injection Requirement. All biosolids will be land applied using subsurface injection equipment so that there is not visible bisolids on the surface.
- (k) Saturated/Frozen Conditions. There shall be no land application during frozen, snow covered or saturated soil conditions. There shall be no land application when there is observation by operator of an imminent or impending rainfall event. When 0.2 inch of precipitation has occurred, an on-site visual investigation of the field's soil moisture condition, followed by analytical testing of the soils, will be made to determine whether land application of biosolids can occur. The visual and analytical soil test procedures will be reviewed and approved by the department as part of the Operation and Maintenance Manual.
- (l) Buffer Zones. There shall be no land application within 300 feet of any down gradient pond, lake, sinkhole, losing stream or water supply withdrawal and within 150 feet of dwelling. For surface application, there shall be no land application within 100 feet of gaining streams (Class P and C classified streams listed in Water Quality Standard rule under 10 CSR 20-7.031); 50 feet of wet weather gaining streams and tributaries (unclassified streams);; or 50 feet of the property line. For subsurface injection, buffer zones may be reduced to 25 feet from gaining streams (classified and unclassified).
- (m) Storm Water Runoff. There shall be no contaminants discharged from the land application sites by storm water that cause violation of the Water Quality Standards rules for general criteria and specific criteria under 10 CSR 20-7.031.
- (n) Metals Loading Limitations. Annual loading of trace metals shall not exceed 10% of the maximum cumulative limits for each metal as specified in University of Missouri publication WQ 425, revised 4/95 (or later addition if published). When the cumulative limit is reached, biosolid addition will be halted. Each time biosolids is spread on a site, the remaining metals capacity of the site will be calculated.
- (o) Log Sheets. Log sheets shall be prepared and kept for each application site showing amounts of biosolids applied per acre, dates of application, nutrients applied, and crop yields.
- (p) Soil Testing Requirements. Testing will be performed on the soils of each application site every year for nitrate nitrogen, every three years for pH, lime requirement, cation exchange capacity, percent organic matter, and available soil test phosphorus (Bray 1P test).

D. SPECIAL CONDITIONS (continued)

12. Industrial BIOSOLIDS - General (continued)

- (q) Annual Report. An annual report shall be submitted with the last regular report of each calendar year, which is due by January 28<sup>th</sup> of the following year. The annual report shall summarize the biosolids management operations for requirements listed in the permit and Biosolids Management Plan. This includes: who removed the sludge, the number of gallons or quantity of biosolids removed, the percent solids of the biosolids, the amount of biosolids applied per acre, nutrients applied per acre, crop yields, the dates and locations of the applications, the cumulative amount of biosolids applied per acre, the testing results for biosolids, soils and groundwater wells, and daily precipitation amounts. Report forms for the annual report shall be approved by the department and included in the Biosolids Management Plan.

13. Industrial Biosolids- Plant Available Nitrogen (PAN) Procedure

- a. Wastewater, sludge and fertilizer nitrogen applications shall not exceed the crop nitrogen requirements based on realistic crop yield goals and the Plant Available Nitrogen (PAN) method. The wastewater application rate shall be calculated as follows:

$$\text{PAN} = \text{CNR} - \text{SRN} - \text{CFN}$$

WHERE: **CFN** = Commercial Fertilizer Nitrogen applied in pounds N/acre.  
**CNR** = Crop Nitrogen Requirement in pounds N/acre  
**PAN** = Plant Available Nitrogen in wastewater and sludge  
expressed as annual pounds N/acre.  
**SRN** = Soil Residual Nitrogen in pounds N/acre.

- b. Plant Available Nitrogen(PAN) is calculated as follows:

$$\begin{aligned} \text{PAN} = & [\text{Ammonia Nitrogen}] \times [\text{Availability Factor}] \\ & + [\text{Organic Nitrogen}] \times [\text{Availability Factor}] \\ & + [\text{Nitrate Nitrogen}] \times [\text{Availability Factor}] \end{aligned}$$

For anaerobic treated wastewater and sludge, the nitrate nitrogen amounts will be negligible and can be ignored.

- c. Plant Available Nitrogen (PAN) Availability factors for wastewater and sludge are as follows:

<u>Type of Nitrogen</u>	<u>Surface Application</u>	<u>Immediate Incorporation or Subsurface Injection</u>
Ammonia	0.6*	0.9*
Organic	0.10 - 0.70**	0.10 - 0.70**
Nitrate	0.9*	0.9*

- \* Nitrogen availability based on average of typical soil and climate conditions when considering additions due to precipitation, dry deposition, and foliar absorption versus losses due to volatilization and denitrification. Allowance for about 10% denitrification is included for moderate to well drained soils. Alternate soil denitrification factors for nitrogen may be considered for poorly drained soils based on site specific soil conditions for each field. See National Engineering Handbook, Part 651 (AWMFH), Table 11-8.

D. SPECIAL CONDITIONS (continued)

13. Industrial Biosolids- Plant Available Nitrogen (PAN) Procedure (continued)

- \*\*** Organic Nitrogen = [Total Kjeldahl Nitrogen as N] - [Ammonia as N].  
Availability Factors based on time after application and waste type are:

Type of Sludge/Biosolids Period by Wastewater and Sludge Cumulative <u>Treatment Methods</u>	Availability Factor by Time			
	Year	Year	Year	
	1	2	3	Year 3+
Stabilized Primary and Waste Activated Sludge	0.40	0.20	0.10	0.70
Lime Stabilized Sludge	0.40	0.20	0.10	0.70
Aerobically Digested Sludge	0.30	0.15	0.08	0.53
Anaerobically Digested Sludge	0.20	0.10	0.05	0.35
Composted Sludge (Class A)	0.10	0.05	0.03	0.18
Sludge from aerobic wastewater lagoon	0.20	0.10	0.05	0.35
Wastewater/sludge from anaerobic lagoons	0.40	0.20	0.10	0.70

NOTES: Year 1 is the current year of waste application; year 2 is the previous year of waste application; and year 3 is waste application two years ago. Nitrogen availability for years 1, 2 and 3 must be added when waste is applied in consecutive years. The cumulative factor is used when waste is applied at about the same rate for 3 consecutive years or longer.

d. Soil Residual Nitrogen (SRN).

1. For Annual Crops, the nitrogen availability from soil organic matter must be included based on soil CEC and crop season as follows:

SRN in pound N/acre\* = [percent organic mater] x Soil Availability Factor

<b>Soil Availability Factor by Soil CEC Ranges and Organic Matter</b>				
<b>Growing Season</b>	<b>Organic Matter</b>	<b>CEC # 10</b>	<b>CEC 10-18</b>	<b>CEC &gt;18</b>
<b>Summer</b>	1%	40*	20	10
<b>Winter</b>	1%	20*	10	5

**\*Note:** If CEC is less than 10 and organic matter is 1.5% or greater, the total SRN is constant at 60 pounds nitrogen for summer and 30 pounds for winter.

2. For Perennial Crops the SRN is considered zero(0) for purposes of these calculations because the SRN has already been considered in the crop fertilization recommendations in the referenced publications.

- e. Crop nitrogen requirements shall be based on University of Missouri publication, Soil Test Interpretations and Recommendations Handbook, as revised or one of the other reference publications listed in this permit. Alternate reference publications may be used only upon prior approval by the department and shall be listed in the approved Operation and Maintenance Manual.
- f. If a crop is not harvested, the PAN rate shall not exceed 40 lbs/acre/year and grass vegetation must be maintained on the site.

D. SPECIAL CONDITIONS (continued)

13. Industrial Biosolids- Plant Available Nitrogen (PAN) Procedure (continued)

g. PAN calculations, application amounts, crop yields and crop removal rates shall be listed in the annual report.

h. Conversion Factors for laboratory testing results:  
[mg/L or mg/kg or ppm] x [conversion factor] = [pounds per Unit Volume]

<u>Unit Volume</u>	<u>Conversion Factors</u>
lbs/acre inch	0.226
lbs/1,000 gallons	0.0083
lbs/100 cubic feet	0.0062
lbs/ton (wet wt)	0.002

i. Alternate nitrogen availability factors may be considered based upon site specific conditions for each field and submittal of scientific justification. Alternate factors will be reviewed and approved by the department as part of the Operation and Maintenance Manual.

j. Supplemental nitrogen may be added to row crops when determined necessary for proper plant growth based on testing of plant vegetation or soil nitrate testing during the growing season. Procedures will be reviewed and approved by the department as part of the Operation and Maintenance Manual.

k. Primary reference publications used herein are:

1. Livestock Waste Facilities Handbook, Midwest Plan Service, MWPS-18, April 1993.
2. National Engineering Handbook, Part 651, Agricultural Waste Management Field Book, USDA, Natural Resources Conservation Service (NRCS), April 1992 and current supplements.
3. Managing Nitrogen for Groundwater Quality and Farm Profitability, Soil Science Society of America, Inc., 1991.
4. Soil Test Interpretations and Recommendations Handbook, University of Missouri, Department of Agronomy, December, 1992.
5. Land Application of Sewage Sludge, EPA/831-B-93-002b, U.S. Environmental Protection Agency, December, 1994.

### SUMMARY OF TEST METHODOLOGY FOR WHOLE-EFFLUENT TOXICITY TESTS

Whole-effluent-toxicity test required in NPDES permits shall use the following test conditions when performing single or multiple dilution methods. Any future changes in methodology will be supplied to the permittee by the Missouri Department of Natural Resources (MDNR). Unless more stringent methods are specified by the DNR, the procedures shall be consistent with the most current edition of Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms,

#### Test conditions for Ceriodaphnia dubia:

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light, 8 h dark
Size of test vessel:	30 mL (minimum)
Volume of test solution:	15 mL (minimum)
Age of test organisms:	<24 h old
No. of animals/test vessel:	5
No. of replicates/concentration:	4
No. of organisms/concentration:	20 (minimum)
Feeding regime:	None (feed prior to test)
Aeration:	None
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p \leq 0.05$ )
Test acceptability criterion:	90% or greater survival in controls

#### Test conditions for Pimephales promelas:

Test duration:	48 h
Temperature:	25 ± 1°C Temperatures shall not deviate by more than 3°C during the test.
Light Quality:	Ambient laboratory illumination
Photoperiod:	16 h light/ 8 h dark
Size of test vessel:	250 mL (minimum)
Volume of test solution:	200 mL (minimum)
Age of test organisms:	1-14 days (all same age)
No. of animals/test vessel:	10
No. of replicates/concentration:	4 (minimum) single dilution method 2 (minimum) multiple dilution method
No. of organisms/concentration:	40 (minimum) single dilution method 20 (minimum) multiple dilution method
Feeding regime:	None (feed prior to test)
Aeration:	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min.
Dilution water:	Upstream receiving water; if no upstream flow, synthetic water modified to reflect effluent hardness.
Endpoint:	Pass/Fail (Statistically significant Mortality when compared to upstream receiving water control or synthetic control if upstream water was not available at $p \leq 0.05$ )
Test Acceptability criterion:	90% or greater survival in controls